

# OPERATOR'S MANUAL

# 6696X-X

INCLUDING: SERVICE KIT, TROUBLESHOOTING, PARTS LIST, DISASSEMBLY AND REASSEMBLY

RELEASED: 2-12-91  
REVISED: 11-22-96  
(REV. G)

## FOUR-BALL STYLE LOWER PUMP END ALSO COVERS 637240-X43 & 637241-C33 SERVICE KITS

**66960-XXX**  
**(CARBON STEEL)**  
(CANCELLED 9/96)  
(Replaced by 66963-XXX)

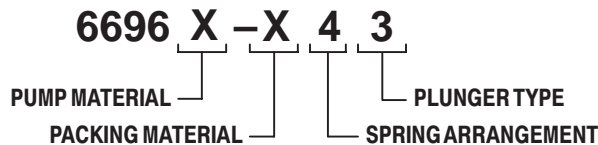
**66961-XXX**  
**(400 STAINLESS STEEL)**

**66963-XXX**  
**(CARBON STEEL)**  
(ELECTROLESS NICKEL PLATED)



**READ THIS MANUAL CAREFULLY BEFORE INSTALLING,  
OPERATING OR SERVICING THIS EQUIPMENT.**

### LOWER PUMP END OPTION DESCRIPTION CHART\*



**PUMP MATERIAL**  
0 CARBON STEEL (CAN'D 9/96)  
1 400 STAINLESS STEEL  
3 CARBON STEEL - E NICKEL PLATED

**PACKING MATERIAL** (PACKINGS ARE UPPER AND LOWER UNLESS NOTED)

1 ⊕ THIOKOL LEATHER	C UHMW-PE
7 GLASS FILLED TEFLON (UPPER) VIRGIN TEFLON (LOWER)	F UHMW-PE / LEATHER STAG'D (UPPER) UHMW-PE (LOWER)
8 ⊕ TEFLON (GF) / LEATHER STAG'D (UPPER) VIRGIN TEFLON (LOWER)	P UHMW-PE / TEFLON STAG'D (UPPER) UHMW-PE (LOWER)
A ⊕ UHMW-PE (UPPER) LEATHER (LOWER)	R TEFLON / UHMW-PE STAG'D (UPPER) TEFLON (LOWER)
B ⊕ UHMW-PE (UPPER) TEFLON (LOWER)	

**SPRING ARRANGEMENT**

1 COIL SPRING ⊕  
2 COMPOSITE SPRING ⊕  
3 NO SPRING ⊕  
4 MULTIPLE WAVE SPRING

**PLUNGER TYPE**

3 HD SS W/HD CHROME PLATING

⊕ AS OF MAY 15, 1995 NO LONGER AVAILABLE

\* NOT ALL MODEL COMBINATIONS ARE AVAILABLE, REFER TO PUMP MODEL MANUAL (650XXX-XXX) FOR "ACTIVE" MODELS.

### SERVICE KITS

- Use only genuine ARO replacement parts to assure compatible pressure rating and longest service life.
- 637240-X43 & 637241-C33 for general repair of 6696X-X43 Lower Pump Ends.

### GENERAL DESCRIPTION

#### LOWER PUMP END

**⚠ WARNING** DO NOT EXCEED MAXIMUM OPERATING PRESSURE AS INDICATED ON PUMP MODEL PLATE.

**⚠ WARNING** REFER TO GENERAL INFORMATION SHEET FOR ADDITIONAL SAFETY PRECAUTIONS AND IMPORTANT INFORMATION. (See the pump model manual for the proper Form No.)

This is one of the four documents which support the pump. Replacement copies of these forms are available upon request.

- 650XXX-X-X MODEL OPERATOR'S MANUAL
- GENERAL INFORMATION - INDUSTRIAL PISTON PUMPS
- 6696X-X LOWER PUMP END OPERATOR'S MANUAL
- AIR MOTOR OPERATOR'S MANUAL

- The four-ball design provides for easy priming of the lower foot valve. The double acting feature is standard on all ARO industrial pumps. Material is delivered to the pump discharge outlet on both the up and down stroke.

### TROUBLE SHOOTING FOUR-BALL PUMPS

#### Lower Pump End Problems

##### No material at outlet / pump continually cycles.

- Check material supply, disconnect or shut off the air supply and replenish the material, reconnect.

##### Material on one stroke only / fast downstroke.

- The lower balls may not be seating in the foot valve (see lower pump disassembly). Remove the balls from the foot valve, clean and inspect the ball and valve seat area. If balls or foot valve are damaged, replace.

##### Material on one stroke only / fast upstroke.

- Check for worn or damaged seals. Replace the seals as necessary.

##### Material leakage out of the solvent cup or material appears on the pump plunger rod.

- For Models (-X4X Only). Increase the load on the packings by tightening the packing nut. Check for worn upper packings and replace them as necessary.

**ARO**

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**INGERSOLL-RAND**  
**FLUID PRODUCTS**

## PACKING OPTIONS AND SERVICE KITS

LOWER PUMP Popular Models	SERVICE KIT	UPPER PACKING				LOWER PACKING		
		51 (X) "V" PACKING			52 (3) "V" PACKING		65 (2) PACKING	
		PART NO	(QTY)	MT'L	PART NO	MT'L	PART NO	MT'L
6696X-XXX	637240-X43							
-713 ☉, -743	637240-743	93688-2	(6)	[T]			92963-3	[T]
-F13 ☉, -F23 ☉, F43	637240-F43	93688-4	(3)	[UH]	93688-1	[L]	92963-4	[UH]
-P13 ☉, -P23 ☉, -P43	637240-P43	93688-4	(3)	[UH]	93688-2	[T]	92963-4	[UH]
-R13 ☉, -R23 ☉, -R43	637240-R43	93688-2	(3)	[T]	93688-4	[UH]	92963-3	[T]

(Also see Page 4 for other models)

☉ AS OF MAY 15, 1995 NO LONGER AVAILABLE// **EXAMPLE: 66960-713 is replaced by 66960-743 & Service kit is 637240-743.**

## COMMON WETTED PARTS

ITEM	DESCRIPTION	(QTY)	66960-XXX (CAN'D 9/96)		66961-XXX		66963-XXX	
			PART NO	[MTL]	PART NO	[MTL]	PART NO	[MTL]
1	Adjustable Packing Nut	(1)	94141-1	[CS]	94141-2	[SS]	94141-1	[CS]
2	Packing Adapter	(1)	94142-1	[CS]	94142-2	[SS]	94142-1	[CS]
4	Screw (3/8-16)	(3)	Y6-67-C	[CS]			Y6-67-C	[CS]
	Allen Head Screw (3/8-16)	(3)			92406	[SS]		
5	Lockwasher (3/8)	(9)	Y14-616	[CS]	Y14-616-T	[SS]	Y14-616-K	[CS]
6	Cap	(1)	92368-1	[CS]	92399	[SS]	92368-4	[CS]
✓ 7	Gasket	(2)	93227	[Ce]	93227	[Ce]	93227	[Ce]
9	Tube	(1)	90176-1	[CS]	93165-1	[SS]	90176-3	[CS]
10	Rod	(4)	90158	[CS]	91128	[SS]	90158	[CS]
11	Cylinder Head	(1)	92370-1	[CS]	93163	[SS]	92370-2	[CS]
12	Nut (7/16-20)	(4)	Y11-107-N	[CS]	Y11-7-T	[SS]	Y11-7-T	[CS]
13	Washer (7/16)	(4)	Y14-716	[CS]				
14	Ball (.937 Diameter)	(2)	Y16-130	[SS]	Y16-130	[SS]	Y16-130	[SS]
✓ 15	"O" Ring (2.379)	(1)	91139	[T]	91139	[T]	91139	[T]
✓ 16	"O" Ring (1.066 O.D.)	(4)	91141	[T]	91141	[T]	91141	[T]
17	Tube	(2)	90160-1	[CS]	91291	[SS]	90160-1	[CS]
18	Housing	(1)	92374-1	[CS]	92401	[SS]	92374-3	[CS]
19	Plate Asm.	(1)	65041-1	[CS]	66773	[SS]	65041-4	[CS]
✓ 20	"O" Ring	(2)	90617	[T]	90617	[T]	90617	[T]
21	Ball (1.25 diameter)	(2)	Y16-140	[SS]	Y16-140	[SS]	Y16-140	[SS]
22	Screw (3/8-16)	(6)	Y6-64-C	[CS]	92405	[SS]	Y6-64-C	[CS]
✓ 25	Gasket	(1)	91288	[Ce]	91288	[Ce]	91288	[Ce]
26	Plunger Rod	(1)	92964	[SS]	92964	[SS]	92964	[SS]
27	Seat	(2)	93292	[SS]	93292	[SS]	93292	[SS]
✓ 28	"O" Ring	(2)	Y328-24	[T]	Y328-24	[T]	Y328-24	[T]
29	Follower	(1)	90193-1	[CS]	93166	[SS]	90193-3	[CS]
30	Nut	(1)	90190	[CS]	91284	[SS]	90190	[CS]
36	Nut	(2)	90189	[CS]	91281	[SS]	90189	[CS]
✓ 38	Gasket	(1)	93231	[Ce]	93231	[Ce]	93231	[Ce]
66	Washer	(2)	90191	[CS]	93167	[SS]	90191	[CS]

### UPPER PACKING PARTS

#### COIL SPRING MODELS -X13 ONLY

ITEM	DESCRIPTION	QTY	PART NO	[MTL]
41	Spring (66960)	(1)	73865	[SS]
	Spring (66961)	(1)	91130	[SS]
50	Washer, Female Backup	(1)	92563	[SS]
53	Washer, Male Backup	(1)	93168	[SS]

### UPPER PACKING PARTS

#### COMPOSITE SPRING MODELS -X23 ONLY

ITEM	DESCRIPTION	(QTY)	PART NO	[MTL]
42	Composite Spring	(1)	66752-104	[SS]
50	Washer	(1)	92563	[SS]

### UPPER PACKING PARTS

#### NO SPRING MODELS: -X33 ONLY

ITEM	DESCRIPTION	QTY	PART NO	[MTL]
70	"W" Packing (Set of 4)	(1)	93355-1	[UH]

### UPPER PACKING PARTS

#### WAVE SPRING MODELS: -X43 ONLY

ITEM	DESCRIPTION	QTY	PART NO	[MTL]
43	Wave Spring	(1)	94145	[SS]
53	Washer, Male Backup	(1)	94144	[De]
115	Washer, Female Backup	(1)	94143	[De]

#### MATERIAL CODE

[Ce] = Celcon	[De] = Delrin	[SS] = Stainless Steel
[CS] = Carbon Steel	[L] = Leather	[T] = Teflon
		[UH] = UHMW-PE

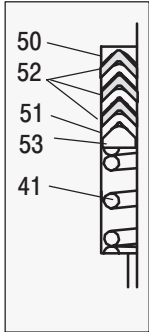
✓ Indicates parts included in Service Kit.

Upper Packing, Lower Packing, Items #7, 15, 16, 20, 25, 28 and 38. (Refer to Packing Charts for correct packings.)

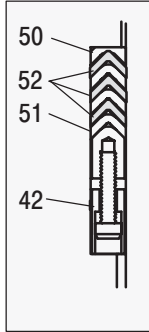
THESE MODELS ARE NO LONGER AVAILABLE AS OF MAY 15, 1995.

UPPER PACKING OPTIONS

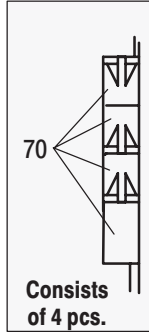
COIL SPRING  
-X13 MODELS



COMPOSITE  
SPRING  
-X23 MODELS



"W" PACKING  
-X33 MODELS



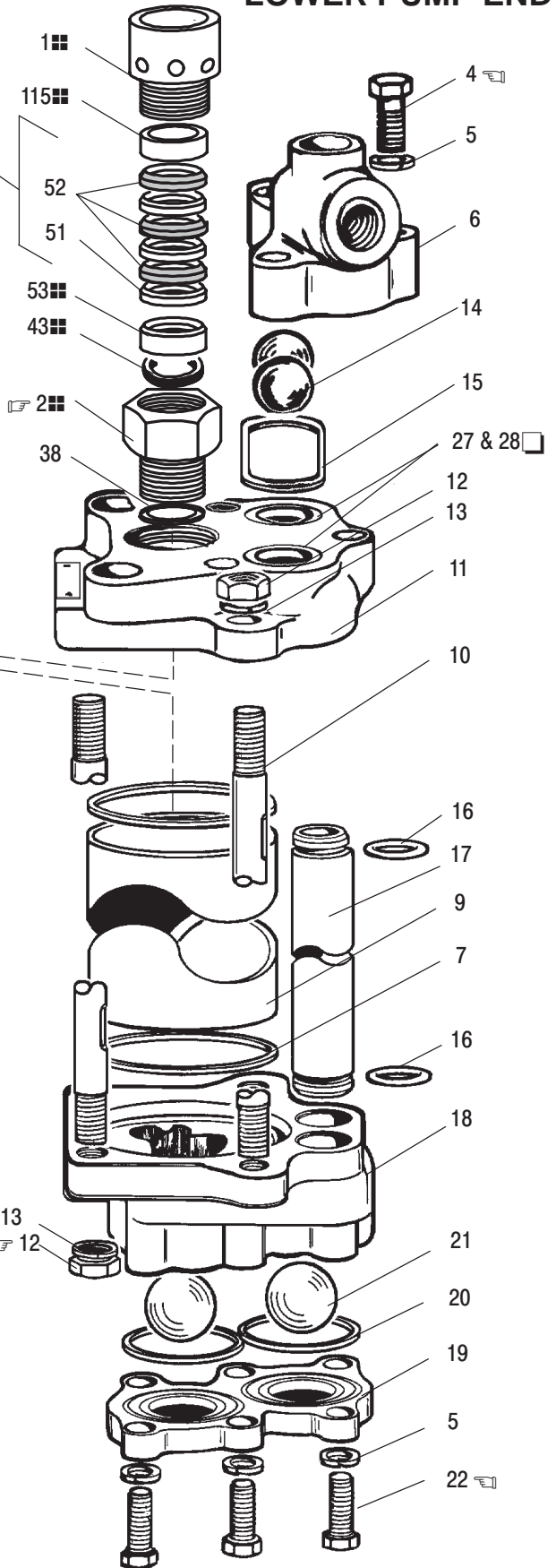
NOTE: When using "STAGGERED" packings use the shaded position as shown in the views above for the "52" packings.

■ These parts are required to update to the latest packing and spring configuration.

□ Replacement Seats are available:  
27 93292-X (2) Seats  
28 Y328-24 (2) "O" rings. (Not Shown)  
"O" Ring included in Service Kit.

LOWER PUMP END

UPPER  
"V" PACKING



LOWER  
CUP PACKING



TORQUE REQUIREMENTS

NOTE: DO NOT OVERTIGHTEN FASTENERS

- ☞ (4) Screw, (12) Nuts, (22) Screws, 25 - 30 ft lbs. (34 - 41 Nm.)
  - ☞ (30) and (36) Nuts 45 - 50 ft lbs. (61 - 68 Nm.)
  - ☞ (2) Packing Adapter 100 - 110 ft lbs. (136 - 149 Nm.)
- Apply Loctite Nickel Antiseize to all threads on 66961-XXX Models.

LUBRICATION / SEALANTS

- ☆ Clean threads on (26) rod & apply Loctite #271 to threads.

## PACKING OPTIONS AND SERVICE KITS

LOWER PUMP	SERVICE KIT	UPPER PACKING						LOWER PKG		
		51 (X) "V" PACKING			52 (3) "V" PACKING		70 PACKING		65 (2) PACKING	
		PART NO	QTY.	MT'L	PART NO	MT'L	PART NO	MT'L	PART NO	MT'L
6696X-XXX	63724X-XX3									
-1X3 ☺	637240-F43	93688-1	(6)	[L]					92963-1	[L]
-8X3 ☺	637240-F43	93688-4	(3)	[UH]	93688-1	[L]			92963-4	[UH]
-A33 ☺	637241-C33						93355-1	[UH]	92963-4	[UH]
-B33 ☺	637241-C33						93355-1	[UH]	92963-4	[UH]
-C13 ☺, C43	637240-C43	93688-4	(6)	[UH]					92963-4	[UH]
-C33 ☺	637241-C33						93355-1	[UH]	92963-4	[UH]

☺ AS OF MAY 15, 1995 NO LONGER AVAILABLE // EXAMPLE: 66960-113 is replaced by 66960-F43 & Service kit is 637240-F43

### LOWER PUMP DISASSEMBLY

1. Unscrew six (22) cap screws to remove (19) ball seat assembly, two (20) "O" rings and two (21) balls.
2. Unscrew three (4) screws and remove (6) cap, two (14) balls and (15) "O" ring.
3. Unscrew (1) adjustable packing nut and remove (115) female washer, six (51) or (51)<sub>(3)</sub>/(52)<sub>(3)</sub> "V" packings, (53) male washer and (43) wave spring. Unscrew (2) packing adapter and remove (38) gasket.
4. Unscrew four (12) nuts and remove (13) lockwashers (if req'd) and (11) head and seat assembly.
5. Unscrew four (10) tie rods from (18) housing and (11) head and seat assembly.
6. Pull two (17) tubes from (18) housing and remove two (16) "O" rings from each (11) tube.
7. Pull (9) tube from (18) housing and remove two (7) gaskets.
8. Pull (26) pump rod and piston cup assembly from (9) tube.
9. Unscrew (30) nut and remove piston cup assembly and (25) gasket from (26) pump rod.
10. To disassemble piston cup assembly, unscrew two (36) nuts. This will enable the two (66) washers and two (65) piston cups to be removed from (29) follower.

### LOWER PUMP REASSEMBLY

- Clean and lubricate parts upon reassembly.
  - Use Loctite Anti-Seize on threads of 66961-XXX assemblies.
  - Refer to parts view on page 3 for packing direction.
1. Place two (65) cups onto (29) follower as shown in figure 2 with two (66) back up washers.
  2. Retain two (65) cups in place using two (36) nuts. Torque nuts to 45-50 ft lbs.
  3. Slip (25) gasket and piston cup assembly onto (26) pump rod.
  4. Screw (30) nut onto (26) pump rod to retain piston cup assembly. Torque to 45-50 ft lbs.
  5. Thoroughly grease (9) tube. Place piston cup assembly into (9) tube.
  6. Place (18) housing in a vise and secure. Screw two (10) rods into (18) housing.
  7. Place four (16) "O" rings onto two (17) tubes. Place two (17) tubes into (18) housing. Place two (7) gaskets into (18) housing and (11) head and seat assembly. Place (9) tube onto (18) housing.
  8. Screw two (10) rods into (11) head and seat assembly.
  9. Insert (38) gasket and screw (2) packing adapter into (11) cylinder head. Insert (43) wave spring, (53) male washer, six (51) or (51)<sub>(3)</sub>/(52)<sub>(3)</sub> "V" packings and (115) female packing washer into (11) head and seat assembly. Screw (1) adjustable packing nut loosely onto (11) head and seat assembly.
  10. Position (11) head and seat assembly over (9) tube, (17) tubes and two (10) rods. Screw two (12) nuts onto two (10) rods protruding thru (11) head and seat assembly. Tighten after other two (12) nuts are assembled. Torque (12) nuts to 25-30 ft lbs.
  11. Place two (14) balls over two holes located in (11) head and seat assembly.
  12. Be sure (15) "O" ring is positioned in groove at bottom of (6) cap (replace if necessary). Place (6) cap in position over (11) head and seat assembly. Screw three (4) screws into (6) cap. Torque screws to 25-30 ft lbs.
  13. Release assembly from vise and lay on work bench.
  14. Tighten two (12) nuts protruding through (18) housing to secure (18) housing to (9) tube. Torque (12) nuts to 25-30 ft lbs.
  15. Position two (21) balls over two ports located in (18) housing. Be sure two (20) "O" rings are in place on (19) plate.
  16. Place (19) plate over (18) housing and secure by using six (22) screws. Torque screws to 25-30 ft-lbs. Tighten (2) adapter, torque to 100-110 ft lbs.